LLNL-PRES-636732

NCSP
NUCLEAR CRITICALITY SAFETY PROGRAM

Other LLNL Accomplishments

Presented at the Nuclear Criticality Safety Program (NCSP) Review, 30 May 2013, Washington, DC

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Other LLNL Accomplishments

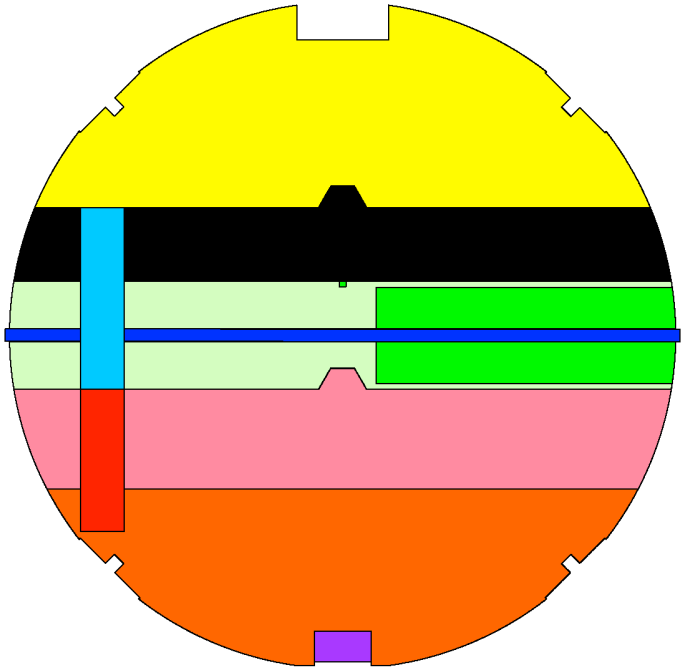
- Analytic Methods
  - COG / ARDRA
  - Automated Data Testing
- IP&D
  - ICSBEP
  - New Classified NCSP Website (ESN)
- T&E
  - Multimedia training modules

Analytic Methods

- COG geometry package included in ARDRA
- Test results shown for OR Sphere

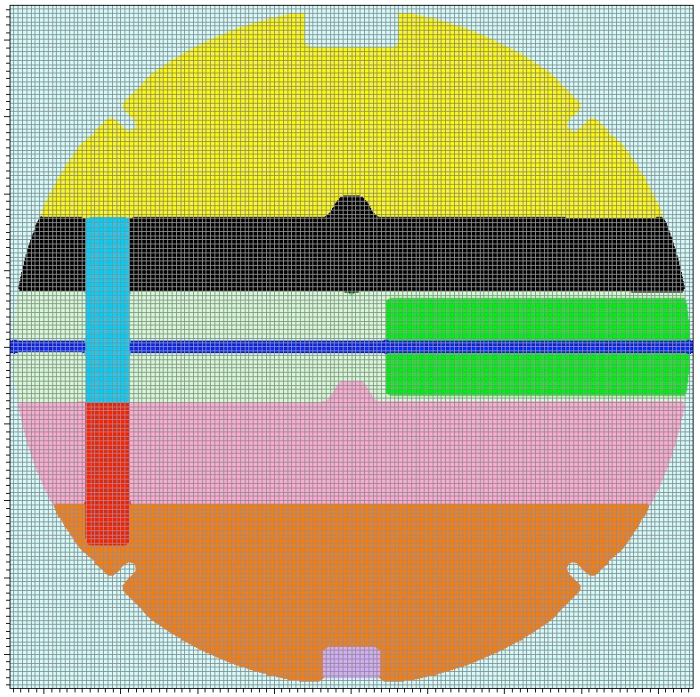
3D Cartesian geometry
160x160x160 mesh
S8 quadrature
87 energy groups
Massively parallel

COG



HMF100-1: keff = 1.00426(9) (ENDF/B-VII.1)
HMF100-2: keff = 0.99816(9) (ENDF/B-VII.1)

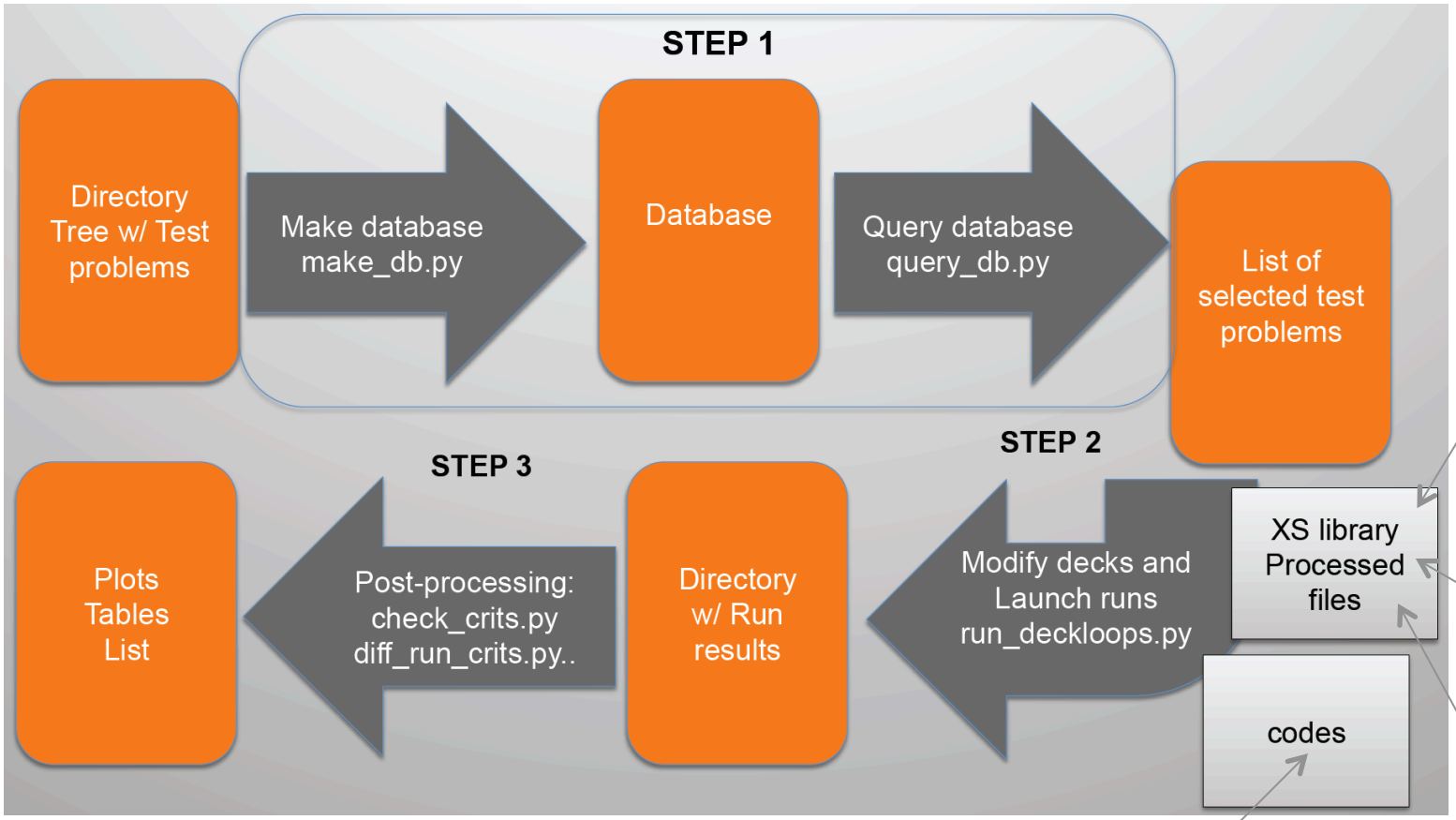
ARDRA



HMF100-1: keff = 1.00431 (ENDL2009.0)
HMF100-2: keff = 0.99760 (ENDL2009.0)

Analytic Methods

- LLNL and BNL are implementing automated V&V
- Presented by Marie-Ann Descalle at ND2013 in NYC



ICSBEP meeting

- Meeting at NEA Headquarters in Paris, May 15-17, 2013
- NCSP participants from LLNL, LANL, VNIITF and Bettis
  Heinrichs Favorite Shmakov Zerkel
- 12 ICSBEP Evaluations
  - 5 NCSP evaluations
  - 1 NE evaluation
  - 6 foreign evaluations
  - 4 IRPhEP evaluations
- NEA will publish a summary record of the meeting as in previous years

ICSBEP meeting – 5 new NCSP evaluations

LEU-COMP-THERM-078	IER-159	Water-Moderated Square-Pitched U(6.90)O2 Fuel Rod Lattices with 0.52 Fuel-To-Water Ratio	Dave Heinrichs For Gary Harms
HEU-MET-FAST-093	IER-129	Heterogeneous HEU and Molybdenum Cylinder with Molybdenum Reflector	Nikolay Stepanov, Marina Chubareva, and Vladimir Shmakov
HEU-MET-FAST-094	IER-129	Two Heterogeneous Cylinders of Highly Enriched Uranium and Molybdenum with Beryllium Moderator and Depleted-Uranium Reflector	Nikolay Stepanov, Marina Chubareva, and Vladimir Shmakov
HEU-MET-MIXED-020	IER-129	Two Heterogeneous Cylinders of Highly Enriched Uranium, Polyethylene, and Molybdenum with Polyethylene Reflector	Nikolay Stepanov, Marina Chubareva, and Vladimir Shmakov
PU-MET-FAST-001 (Major Revision)		Bare Sphere of Plutonium-239 Metal (4.5 at.% ^{240}Pu, 1.02 wt.% Ga)	Jeffrey Favorite

ICSBEP meeting – 7 other evaluations

HEU-MET-FAST-100	ORSPHPERE: Critical, Bare, HEU(93.2)-Metal Sphere	Margaret Marshall
LEU-COMP-THERM-088	Critical Configurations of the IPEN/MB-01 reactor with Heavy Reflectors composed of Carbon Steel and Nickel	Adimir dos Santos
MIX-MISC-THERM-006 X-Ref: MIX-SOL-THERM-009	Arrays of UO_2-PuO_2 PHENIX Pins Containing 26% of Plutonium ($^{240}Pu/Pu_t$=16%) in a Mixed Uranium-Plutonium ($Pu/(U+Pu_t)$ =29.6%, $^{240}Pu/Pu_t$=19%) Nitrate Solution	Gilles Poullot
PU-SOL-THERM-039	Plutonium Temperature Effect Program - Low Concentrated (20, 15 or 14.3 g/l) Plutonium Nitrate Solutions at Temperatures Varying from 28°C to 40°C	Nicolas LeClaire
HEU-SOL-THERM-051	Critical Parameters of Enriched ^{235}U Solutions in Annular Geometry	Luka Snoj Institut Jožef Stefan Odsek za znanosti o okolju Jamova 39 1000 Ljubljana
MIX-MET-FAST-014 IRPhEP ID: (BFS1-LMFR-EXP-003)	BFS-1 Assembly 85: Experiment for Testing Scattering Cross-Sections of Pb-Bi or Pb	Yevgeny Rozhikhin and Anatoli Tsiboulia
MIX-MET-FAST-016 IRPhEP ID: (BFS1-LMFR-EXP-004)	BFS-1 Assembly 87: Experiment for Testing Transport Cross-Sections of Pb-Bi or Pb	Yevgeny Rozhikhin and Anatoli Tsiboulia

ICSBEP meeting – 4 IRPhEP evaluations

HEU-COMP-FAST-001 IRPhEP ID: (SCCA-SPACE-EXP-001)	Critical Configuration and Physics Measurements for Graphite Reflected Assemblies of U(93.15)O2 Fuel Rods (1.27-cm Pitch)	Margaret Marshall
HEU-COMP-FAST-002 IRPhEP ID: (SCCA-SPACE-EXP-002)	Critical Configuration and Physics Measurements for Graphite Reflected Assemblies of U(93.15)O2 Fuel Rods (1.506-cm Pitch)	Margaret Marshall
HEU-COMP-FAST-004 IRPhEP ID: (SCCA-SPACE-EXP-003)	Critical Configuration and Physics Measurements for Beryllium Reflected Assemblies of U(93.15)O2 Fuel Rods (1.506-cm Pitch)	Margaret Marshall
IEU-COMP-THERM-013 IRPhEP ID: (NRAD-FUND-RESR-001)	Fresh-Core Reload of the Neutron Radiography (NRAD) Reactor with Uranium(20)-Erbium-Zirconium-Hydride Fuel	John Bess

UPDATED

NEW

NCSP
NUCLEAR CRITICALITY SAFETY PROGRAM

Information Preservation & Dissemination (IP&D)
A Brief History of the CSBEP, ICSBEP and NCSP

Mr. Dae Chung
Principal Deputy
Assistant Secretary
United States
Department of Energy

In 1992, the Criticality Safety Benchmark Evaluation Project (CSBEP) was founded under the auspices of US DOE Office of Defense Programs by Mr. Dae Chung with criticality safety experts participating from across the US DOE Complex:

- Argonne National Laboratory
- Bettis Atomic Power Laboratory
- Hanford
- Idaho National Laboratory
- Lawrence Livermore National Laboratory
- Los Alamos National Laboratory
- Oak Ridge National Laboratory
- Pacific Northwest National Laboratory
- Sandia National Laboratories
- Rocky Flats Plant
- Savannah River National Laboratory
- Y-12 Plant

Dr. Jerry McKamy
Manager
Nuclear Criticality
Safety Program
Director
Facilities Operations Division
United States
Department of Energy

In 1994, the CSBEP welcomed its first international participants from France, Hungary, Japan, the Russian Federation, and the United Kingdom.

In 1995, to further enhance international participation, the DOE allowed the CSBEP to become an official activity of the Organization for Economic Cooperation and Development (OECD), Nuclear Energy Agency (NEA), Working Party on Nuclear Criticality Safety (WPNCS), and the name was changed to the International Criticality Safety Evaluation Project (ICSBEP).

In 1997, the Nuclear Criticality Safety Program (NCSP) was formally established by DOE under the auspices of the Office of Defense Programs.

Today, the ICSBEP remains an important element of the US DOE NCSP as described by Dr. Jerry McKamy in the NCSP *Mission and Vision*. Current NCSP activities including ICSBEP participation are described in the *Five-Year Execution Plan*.

Page contact: Chuck K. Lee, lee12@llnl.gov.

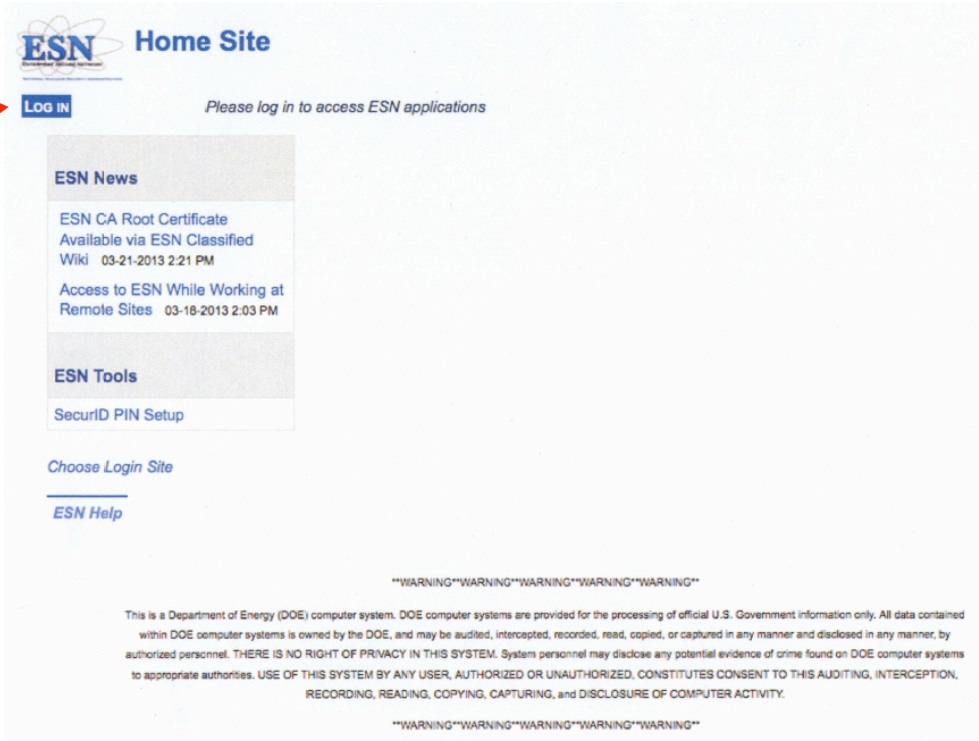
The Lawrence Livermore National Laboratory maintains this website.

Updated: Monday, May 6, 2013

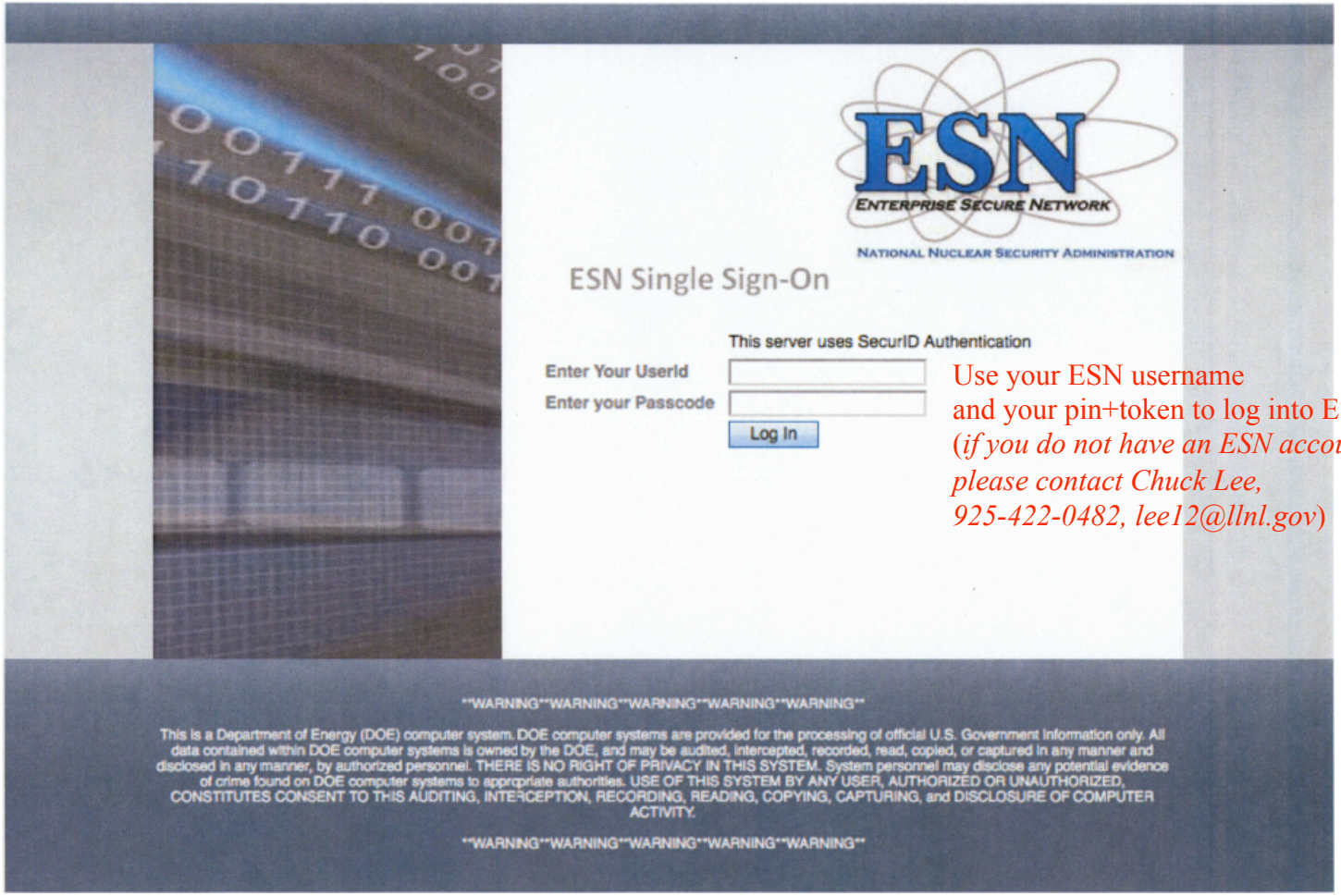
NCSP Classified Website

- **Step 1**: Contact Chuck Lee, (925) 422-0482, lee12@llnl.gov, to obtain an ESN user account
- **Step 2**: On your classified computer, using your web browser, go to https://www.central.esn.gov/wiki/display/ehs/Home+Site

Click the LOG IN button to log in to access the classified NCSP website

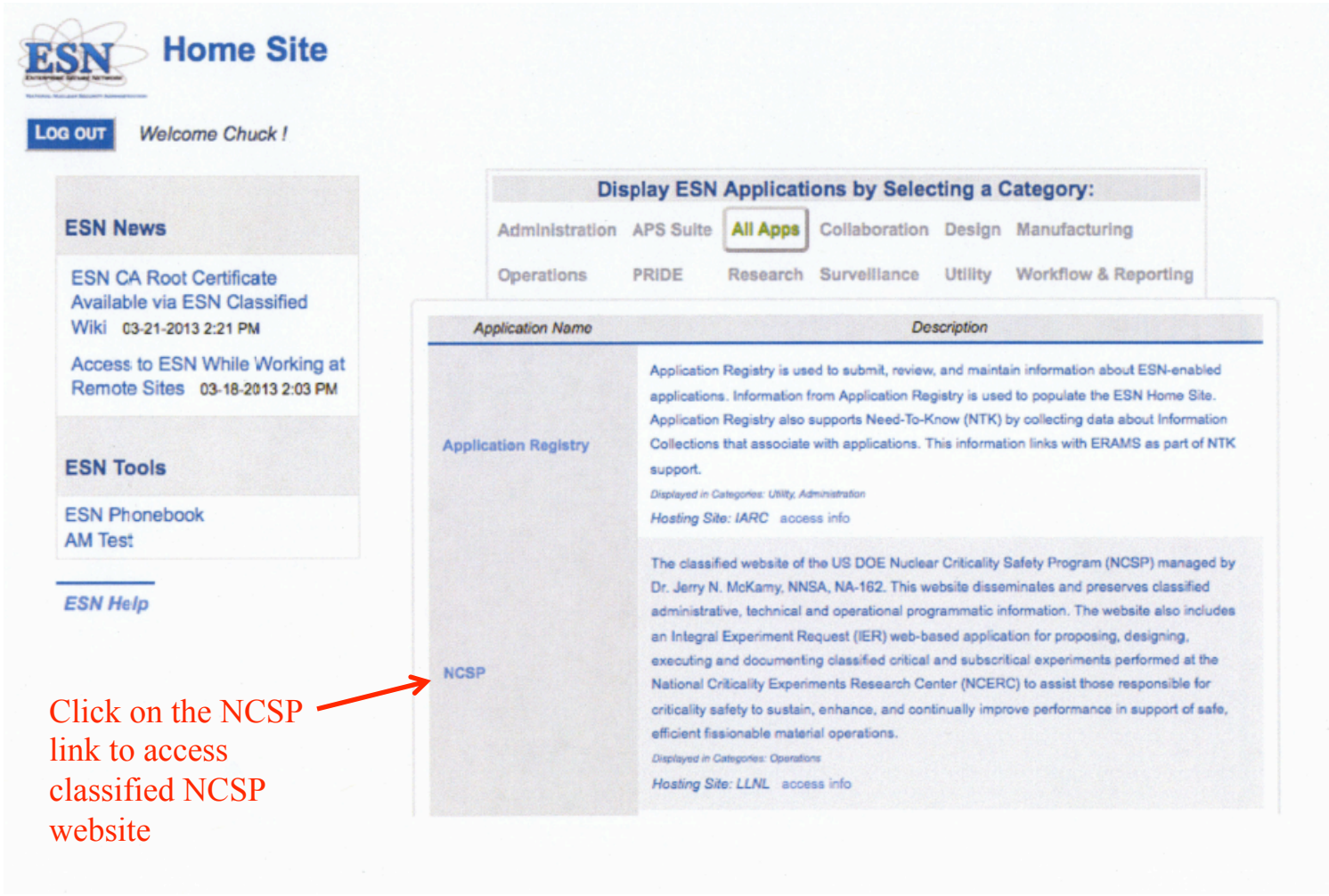


NCSP Classified Website -Continue



Use your ESN username and your pin+token to log into ESN (*if you do not have an ESN account please contact Chuck Lee, 925-422-0482, lee12@llnl.gov*)

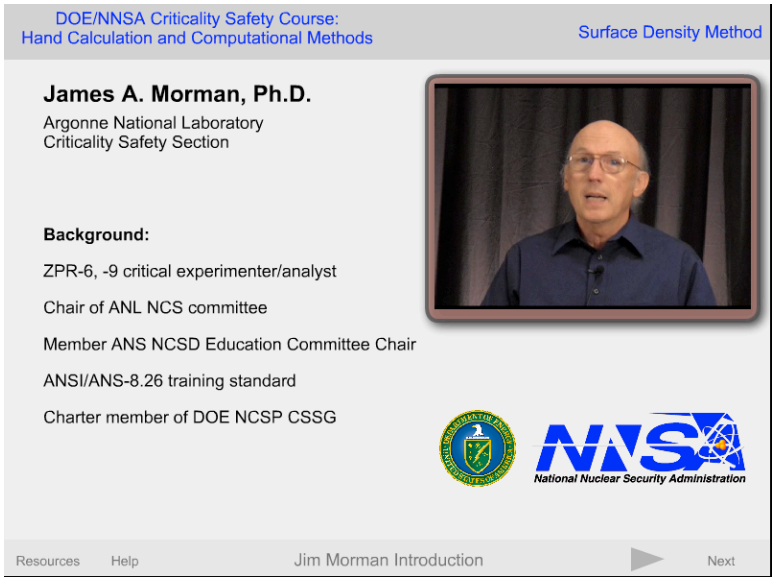
NCSP Classified Website -Continue



T&E Multimedia NCSET Modules

- LLNL completed 2 of 3 multimedia conversions of NCSET Module 8, Part I, Hand Calculations:

http://ncsp.llnl.gov/ncset/Criticality_Buckling_Method/player.html



http://ncsp.llnl.gov/ncset/Criticality_Surface_Density/player.html

- Looking forward to your feedback!